

Volume 3. Air Operator Technical Administration

CHAPTER 10. EMERGENCY EVACUATION AND DITCHING DEMONSTRATIONS

SECTION 1. GENERAL

1681. GENERAL.

A. This chapter provides direction and guidance to inspectors for planning, observing, and evaluating emergency evacuation and ditching demonstrations. Effective emergency evacuation procedures have significantly reduced the number of casualties in survivable aircraft accidents. The Federal Aviation Administration (FAA) considers an operator's ability to perform these procedures an extremely important factor of aviation safety.

B. The need for a full scale or a partial aborted takeoff demonstration will be determined by the Principal Operations Inspector (POI) and the Cabin Safety Inspector (CSI) (if applicable) in conjunction with the certificate holding district office (CHDO). The CHDO will coordinate with the regional office and, if needed, the regional office may coordinate with AFS-200. The CHDO will assign an inspector to coordinate the demonstration as the FAA Team Leader. The CHDO may also use the Certification, Standardization, and Evaluation Team (CSET) as a technical resource during any demonstration process. During initial airline certification, the CHDO will follow the provisions in HBAAT 99-09, Introduction of an Automated Process for Certification of New Entrant 14 CFR Part 121 Air Carriers.

C. Title 14 of the Code of Federal Regulations (14 CFR) part 121 operators must conduct a full-scale or a partial aborted takeoff evacuation demonstration for any airplane with a seating configuration of more than 44 passenger seats. Part 121 operators must conduct a full-scale or partial ditching evacuation demonstration for any land airplane intended for extended-overwater operations. The need to conduct full-scale or partial demonstrations depends primarily upon whether a full-scale demonstration has been previously accomplished by another part 121 operator or a manufacturer. These demonstrations specifically test the following areas:

- The operator's emergency training program and crewmember competency
- The operator's emergency evacuation and ditching procedures

- The reliability and capability of the emergency equipment on the airplane

D. An airplane manufacturer must conduct an emergency evacuation demonstration in accordance with 14 CFR part 25 § 25.803 to obtain type-certification. This demonstration is the responsibility of the applicable FAA Aircraft Certification Office (ACO). This demonstration tests the following:

- The basic airplane design and the efficiency with which passengers can be safely evacuated from it
- The emergency evacuation systems on the airplane
- The manufacturer's FAA-approved emergency evacuation procedures

E. The planning, conduct, observation, and evaluation of an operator's or manufacturer's emergency evacuation demonstration is outlined throughout the following sections in this chapter.

1683. REGULATORY REQUIREMENTS. Part 121 § 121.291, Appendix D, and § 25.803 specify the requirements for conducting these demonstrations, when they must be performed, how they are to be conducted, and the specific criteria which the operator or manufacturer must meet. These regulations specify the following four types of evacuation demonstrations:

- Full-scale aborted takeoff
- Partial aborted takeoff
- Full-scale ditching
- Partial ditching

FYI: For the purposes of part 121 emergency evacuation demonstration requirements, the terms "capacity" and "configuration" have the same meaning with respect to passenger seating.

A. Full-Scale Aborted Takeoff.

(1) Section 121.291(a) requires an operator to conduct a full-scale emergency evacuation demonstration when the airplane type and model has not been demonstrated previously

by another operator in accordance with part 121, Appendix D, or by a U.S. or foreign manufacturer during type certification in accordance with § 25.803 and part 121, Appendix D. A full-scale emergency evacuation demonstration simulates an aborted takeoff. Section 121.291(a) requires, before initiation of the demonstration, that each installed passenger seat be occupied by a passenger participant. Section 25.803 provides that under certain circumstances, when a manufacturer conducts a demonstration, all installed passenger seats do not need to be occupied. In these circumstances, the Aircraft Certification Office (ACO) has the authority to permit designated installed passenger seats to be unoccupied for the demonstration. However, the controlling factor for determining the allowable seating capacity of the aircraft is the total number of passengers occupying seats during a full-scale evacuation demonstration and not the number of installed passenger seats.

(2) After the initiation signal, all passenger participants and crewmembers must be evacuated using the airplane's emergency evacuation equipment and not more than 50 percent of the emergency exits and slides. The demonstration must show that the airplane and its emergency equipment, using the operator's emergency procedures, allows for the evacuation of its full seating capacity, including crewmembers, in 90 seconds or less. Additionally, if an operator proposes to use a type and model airplane with a seating capacity greater than has ever been previously demonstrated for that particular type and model, the operator must conduct a full-scale demonstration with that type and model of airplane.

(3) Section 25.803(d) permits the use of a combination of analysis and tests for the purpose of increasing seating capacity. When an operator makes a request to use the provisions of § 25.803(d), the CHDO should coordinate with AFS-200, through the regional office. (See paragraph 1685 for more information on the use of analysis and tests for increasing seating capacity.)

(4) Part 121 Appendix D outlines specific conditions and criteria used during full-scale emergency evacuation demonstrations. The appendix is divided into two sections. Section (a), the aborted takeoff demonstration, specifies the requirements for a full-scale evacuation demonstration including such factors as environmental conditions, passenger complement, crewmember qualifications, and the number of exits to be opened. Section (b), the ditching demonstration, specifies the requirements for a simulated ditching including testing crewmember knowledge of emergency equipment, procedures, and emergency equipment reliability.

B. Partial Aborted Takeoff. Section 121.291(b) specifies situations when an operator is required to conduct a partial emergency evacuation demonstration. No passenger participants are used in a partial demonstration. A partial emergency evacuation demonstration simulates an aborted takeoff and requires that, before initiation of the demonstra-

tion, the flight attendants occupy their normal takeoff positions. After the initiation signal, the aircraft's emergency evacuation equipment and 50 percent of the required emergency exits and slides must be ready for use in 15 seconds or less. A partial emergency evacuation demonstration must be conducted in the following situations:

(1) When an operator takes delivery of a new type/model of airplane which has previously had a full-scale emergency evacuation demonstration conducted (in accordance with § 121.291(a)) by another part 121 operator or an aircraft manufacturer (in accordance with § 25.803 and § 121.291(a))

(2) When an operator proposes to "significantly change" the number of flight attendants, their seating location, their evacuation duties, or emergency procedures. "Significant change" is a determination made by the Principal Operations Inspector (POI) and Cabin Safety Inspector (CSI), if applicable, when an operator proposes to change the number of flight attendants, their seating location, their evacuation duties, or emergency procedures.

(a) *Number.* A change in the number of required flight attendants requires an evacuation demonstration. The minimum number of flight attendants (sometimes referred to as required flight attendants) is stipulated in the air carrier's operations specification. The need for an evacuation demonstration is based solely on a change in the number of "required" flight attendants that were used in the former evacuation demonstration for that type and model of aircraft by that operator. When a change in seating configuration requires the addition of flight attendants required by § 121.391(a) or allows the reduction of flight attendants required by § 121.391(a), a partial demonstration is required if that operator has not previously demonstrated that seating capacity with that complement of flight attendants. A change in seating capacity which does not result in the addition of a required flight attendant usually does not constitute a "significant change" and a partial demonstration usually is not required. In addition, if there is a reduction in the seating capacity but the air carrier does not wish to operate the aircraft with a reduction in the number of flight attendants, a partial demonstration is not required. In some cases, however, depending on changes in flight attendant duties and/or procedures, a change in the seating capacity which does not result in the addition or reduction of flight attendants may require a partial demonstration.

(b) *Location.* When an operator proposes to change a flight attendant seating assignment for any reason, the POI and CSI, if applicable, must consider if that action significantly changes the flight attendant's duties and/or responsibilities. For example, changing a flight attendant seating assignment from one floor-level exit to an adjacent floor-level exit may not constitute a "significant change" in flight attendant duties. However, if an operator changes the seating location because of a new procedure which requires,

for the first time, flight attendants to open overwing window exits, that action would constitute a “significant change” and would require a partial demonstration.

(c) *Duties and procedures.* When an operator proposes to change emergency evacuation duties or procedures, the POI and CSI, if applicable, must consider the scope and character of the change in determining the requirement for a partial evacuation. If the degree of change requires flight attendant actions or knowledge which has never been previously required or demonstrated, a partial demonstration is required. If the change in duties or procedures is minor or can adequately be dealt with through the operator’s training program, a demonstration may not be required. Most of the time, changes in flight attendant duties will constitute a significant change, for example, if a flight attendant will now be required to open two doors instead of one door, or if a flight attendant position has a new exit responsibility at the overwing exits.

(3) When an operator proposes to “significantly change” the number, location, type of emergency exits, or type of opening mechanism on emergency exits available for evacuation.

(a) *Number.* A change in the number of exits is usually not a significant change especially if the exits are all the same type as other exits and are located in the same area. For example, if the variant airplane has two pairs of overwing exits instead of one pair, this would not be a significant change if all the exits were of the same type and operated the same way.

(b) *Location.* A change in the location of exits could be a significant change, but usually is not. If the exits are the same identical type and the only change in location is several feet, this might not be a significant change.

(c) *Type of exit or opening mechanism.* Evaluation of training and procedures is one of the reasons for conducting partial evacuation demonstrations. A change in the opening mechanism of an exit is a significant change and a partial evacuation demonstration should be required so that the FAA may assess training on the new opening mechanism.

(4) Whenever an operator proposes to make one of the changes previously discussed, the POI and CSI, if applicable, must consider flight attendant knowledge, experience, and the operator’s training program in determining the degree and significance of the change. The increase in complexity of the duties for each flight attendant in terms of additional exits, seats, or briefing responsibilities should also be considered.

NOTE: All determinations about significant changes and the need for an evacuation demonstration will be made by the POI and CSI, if applicable. This determination should be coordinated by the POI with the regional office, through the CHDO. If

needed, the regional office may coordinate with AFS-200.

(5) Section 121.291(c) specifies the criteria used for evaluating a partial evacuation demonstration. The operator must demonstrate the effectiveness of its crewmember emergency training and evacuation procedures by accomplishing the following:

- Conducting a demonstration without passenger participants using the operator’s line operating procedures
- Opening the exits, as selected by the FAA, and deploying the slides, if applicable, so that the exits and slides, are “ready for use” within 15 seconds
- Using company flight attendants who have completed the approved training program for the type and model of airplane being demonstrated.
- Opening 50 percent of the required floor-level exits
- Opening 50 percent of the required non-floor-level exits if operator developed procedures require flight attendants to open those exits
- Deploying 50 percent of the exit slides, if applicable

NOTE: Failure to open all exits selected by the FAA will constitute a failure of the demonstration.

(6) The following information should be taken under consideration when defining the term “ready for use”:

(a) Floor level exits with slides are defined as “ready for use” when the exit is fully opened and the emergency exit slides are completely deployed or inflated and properly positioned in a manner which would not impede passenger or crewmember egress. The inflation cylinder may still be making a hissing sound and the slide may not actually touch the ground until the first passenger uses the slide. Neither one of these situations would prevent the slide from being “ready for use.”

(b) Floor level exits with stairs are defined as “ready for use” when the exit is fully opened, the stairs are fully extended, and the bottom of the stairs is within six inches of the ground.

(c) Exits not equipped with a means of escape present some different considerations when defining “ready for use.” In this case, it is important for the FAA Team Leader to determine what the carrier’s procedures are and to use those company procedures to define when the exit is “ready for use.” For example, in the case of an overwing exit, the crewmember must simulate placement of the hatch in accordance with airline procedures. In the case of a floor level plug/hatch on some smaller aircraft, this might mean

that the hatch falls out of the aircraft and lands directly under the door sill.

C. Full-Scale Ditching. Section 121.291(d) requires an operator who intends to operate an airplane in extended-overwater operations to conduct a full-scale simulated ditching demonstration in accordance with part 121 Appendix D, if that type and model of airplane has not had a previous ditching demonstration conducted by another part 121 operator.

NOTE: 14 CFR part 1 § 1.1 defines “extended-overwater operations” as flights conducted at a horizontal distance of more than 50 nautical miles from the nearest shoreline.

D. Partial Ditching. Section 121.291(e) permits an operator to conduct a partial ditching demonstration if a full-scale simulated ditching demonstration for that type and model of airplane has been conducted by another part 121 operator.

E. Manufacturer-Conducted Demonstrations. Section 25.803(c) requires manufacturers of transport category airplanes having more than 44 passenger seats to conduct a full-scale demonstration in order to be issued a type certificate. If the manufacturer desires the demonstration to serve both the certification requirements of § 25.803(c) and the operational requirements of § 121.291(a), the demonstration shall be conducted in accordance with § 25.803(c) and the procedures described in the following subparagraphs.

(1) The manufacturer’s demonstration is conducted in accordance with the certification requirements outlined in § 25.803. The FAA’s Aircraft Certification Offices (ACO) have primary responsibility for planning, conducting, and evaluating a manufacturer’s emergency evacuation demonstrations.

(2) Emergency evacuation demonstration requirements of § 25.803 were upgraded (in 1978) to be equivalent to those required by part 121. This was done so that one demonstration would suffice for both the issuance of an aircraft type certificate and for compliance with the operational requirements of § 121.291. Although the ACOs are primarily responsible for § 25.803 evacuation demonstrations, coordination with Flight Standards personnel is necessary to ensure compliance with “operational requirements.” This coordination shall be accomplished as follows:

(a) The manufacturer’s plan must be reviewed by AFS-200 for operational compliance. AFS-200 and the applicable ACO must concur on the acceptability of the plan. AFS-200 must respond to the ACO in a timely manner. The lack of a timely response shall not be grounds for delaying the demonstration.

(b) Flight standards personnel shall participate in the actual demonstration. As previously stated, AFS-200 is required to concur with the approval of an applicant’s plan

for a full-scale emergency evacuation demonstration under § 25.803. Approval and concurrence of this plan with flight standards and the participation of flight standards personnel in a successful emergency evacuation demonstration conducted by a manufacturer is considered to meet the requirements of § 121.291(a)(1).

NOTE: When there are no purchasers for an aircraft or the only purchaser is a foreign carrier, crewmembers used in a manufacturer’s evacuation demonstration must be trained in a program similar in content and duration to the emergency evacuation portion of training programs approved under part 121. This is required so that the full-scale evacuation demonstration will also meet the requirements of § 121.291.

1685. INCREASING SEATING CAPACITY BY ANALYSIS AND TESTS, SECTION 25.803(D).

A. Section 25.803(c) states that a combination of analysis and tests may be used to show that an airplane is capable of being evacuated within 90 seconds under the conditions specified in Appendix J to part 25. If the Administrator finds this combination of analysis and tests will provide sufficient data on the emergency evacuation capability of the airplane, and the data is equivalent to that which would be obtained by actual demonstration, then an actual demonstration may not need to be conducted. It is FAA policy, however, to prohibit the use of analysis and test for the purpose of increasing seating capacity greater than 5 percent above the seating capacity established by a full-scale emergency evacuation demonstration. For example, if a full-scale emergency evacuation demonstration was successfully accomplished on an aircraft in accordance with § 25.803 and § 121.291 and the maximum seating capacity established was 200 passengers, the analysis and test method would allow an increase up to a maximum of 10 additional passengers seats. In this example, no further increase in seating configuration above the 210 limit would be permitted without a full-scale demonstration.

NOTE: In the above example, the analysis and test method would allow an increase from a maximum seating capacity of 200 to a maximum seating capacity of 210 without a requirement for another full-scale evacuation. However, in this example, the increase in passenger capacity would require an additional flight attendant as per part 121, § 121.391. This would constitute a “significant change” in the number of flight attendants and would require a partial evacuation demonstration.

B. This five percent increase may not be approved by the principal inspector without the analysis and tests being evaluated by the appropriate ACO. Any request for an increase of up to five percent by the analysis and test

method shall be forwarded through AFS-1 to the appropriate ACO. The ACO is the organization within the FAA authorized to evaluate this type of analysis and test.

C. Increases in passenger seating capacity beyond the maximum exit capacity of the aircraft as determined by § 26.807(g) shall not be permitted under any circumstance.

1687. CONTENTS OF THIS CHAPTER. Sections 2 and 3 describe the requirements and procedures for the aborted takeoff demonstration. Section 4 describes the

ditching demonstration process. Sections 5 and 6 outline evaluation criteria and reporting requirements for the aborted takeoff and the ditching emergency evacuation demonstrations. Section 7 stipulates the maximum seating capacity for air carrier airplanes used in part 121 operations. An emergency evacuation/ditching demonstration job aid is available on the Job Aid Disc (see figure 3.10.1.1).

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FIGURE 3.10.1.1.

EMERGENCY EVACUATION/DITCHING DEMONSTRATION

OPERATOR NAME:		DESIGNATION CODE:		
PTRS CODES	OPS 1311	MAINT 3308	AVIONICS 5308	
I. ESTABLISHING DEMONSTRATION REQUIRMENTS	REMARKS			
A. New Applicant <ol style="list-style-type: none"> 1. Full-Scale Aborted Takeoff 2. Partial Aborted Takeoff 3. Ditching Demonstration B. Existing Operator <ol style="list-style-type: none"> 1. Full-Scale Aborted Takeoff 2. Partial Aborted Takeoff <ol style="list-style-type: none"> a. Aircraft new to operator b. Significant change in number of F/A's, seating location, duties, or procedures c. Change in emergency exit type, number, location, or opening mechanism (coordinate with AFS-1) 3. Ditching Demonstration <ol style="list-style-type: none"> a. Newly initiated extended overwater ops b. Full-scale demonstration c. CSET coodintation <ol style="list-style-type: none"> (1) New Applicant (2) Existing operator 				
II. PRELIMINARY MEETING WITH APPLICANT <ol style="list-style-type: none"> A. Discuss demonstration requirements <ol style="list-style-type: none"> 1. 14 CFR Part 121 2. Advisory Circular 3. Handbook B. Establish communication liaison <ol style="list-style-type: none"> 1. FAA team leader _____ 2. Company coordinator _____ 3. Telephone No. _____ C. Outline plan requirements 				

FIGURE 3.10.1.1.(CONT'D.)

III. OPERATOR'S PLAN	REMARKS
<p>A. Letter of Request</p> <ol style="list-style-type: none"> 1. Applicable regulations 2. Airplane type, model, seating capacity 3. Number of flight attendants to be used 4. Proposed date, time, and location of the demonstration 5. Statement of how the demonstration shall be initiated and how exits will be blocked <p>B. Airplane interior drawing</p> <ol style="list-style-type: none"> 1. Location and designation of exit types/pairs 2. Assigned seating location of each required crew-member 3. Cabin configuration showing locations of each: <ol style="list-style-type: none"> a. pax seating b. galley c. aisles d. lavatories e. pax component partitions/bulkheads 4. Location and type of emergency equipment <ol style="list-style-type: none"> a. fire extinguishers b. portable O2 bottles/masks c. megaphones d. crash axes e. emergency ropes/tapes f. liferafts/slides/emergency stairs g. emergency locator transmitters h. flotation devices/life preservers i. first aid and emergency medical kits and protective gloves j. protective breathing equipment k. automated external defibrillator (if applicable) l. enhanced emergency medical kits (if applicable) m. survival kits (if applicable) n. flashlights o. door warning flag (door arm strap, if applicable) p. signaling devices (overwater) q. survival radios (overwater) r. door restraining/barrier strap (if applicable) <p>C. Applicant's ops manual describing emergency evacuation ditching crew duties and procedures</p> <p>D. Copy of Pax info seat card</p> <p>E. Description of emergency equipment (type and model of each item)</p> <p>F. List of qualified flight crewmembers and cabin crewmembers</p> <p>G. Description of how operator will ensure "dark of night"</p> <p>H. Description of how operator will ensure the airplane will be positioned in a manner which allows for the unobstructed deployment of emergency equipment</p>	

FIGURE 3.10.1.1.(CONT'D)

IV. ANALYSIS OF APPLICANT'S PLAN	REMARKS
<ul style="list-style-type: none"> A. Emergency training program FAA approved B. Applicant's emergency procedures in manual are complete and practical C. Safety information card complete and complies with AC 121-24, as amended D. Emergency equipment acceptable for type of operation E. Proposed site for demo acceptable F. Safeguards proposed for all participants acceptable G. All above items must be resolved before proceeding further 	
<p>V. THE FAA PLAN (PREDEMONSTRATION MEETING)</p> <ul style="list-style-type: none"> A. Team member assignments <ul style="list-style-type: none"> 1. Timekeeping 2. Interior/Exterior positions 3. Predemonstration inspection of the airplane/emergency equipment 4. Post demonstration inspection 5. Report writing B. Determine Exits to be Opened/Blocked C. Select Crewmembers from Operator's List D. Review Initiation/Termination Signals E. Review of Requirements <ul style="list-style-type: none"> 1. 14 CFR part 121 2. Handbook 	

FIGURE 3.10.1.1.(CONT'D)

VI. PREDEMONSTRATION INSPECTION	REMARKS
<p>A. The team shall inspect the following specific items to ensure regulatory compliance:</p> <ol style="list-style-type: none"> 1. Hand fire extinguishers for crew, passenger, cargo, and galley compartments (§ 121.309(b) and (c)). 2. Protective breathing equipment (§ 121.337). 3. First aid equipment (§ 121.309 (b) and (d)). 4. Crash ax (§ 121.309 (b) and (e)). 5. Megaphones (§ 121.309 (b) and (f)). 6. Interior emergency exit markings (§ 121.310 (b)). 7. Flotation devices or life preservers (§ 121.339 (a)(1); § 121.309(b); and § 121.340). 8. Lighting for interior emergency exit markings (§ 121.310 (c)). 9. Emergency light operations (§ 121.310(d)). 10. emergency exit operating handles (§ 121.310(e)). 11. Emergency exit access (§ 121.310(f)). 12. Exterior exit markings (§ 121.310(g)). 13. Exterior emergency lighting and escape route (§ 121.310(h)). 14. Floor level exits (§ 121.310(i)). 15. Additional emergency exits (§ 121.310(j)). 16. Ventral or tail cone exits (§ 121.310(k)). 17. Portable lights (§ 121.310(l)). 18. Seats, safety belts, and shoulder harnesses (§ 121.311 (a), (c), (e), and (f)). 19. Emergency Equipment required for extended over-wateroperations (§121.309(b) and 121.339). 20. Public address system (§ 121.318). 21. Passenger information signs/placards (§ 121.317). 22. Cockpit escape system (§ 25.805). 23. Slides and sliderafts (§ 121.309(b) and § 121.310(a)). 24. Lavatory Fire Protection (§ 121.308). 	

FIGURE 3.10.1.1.(CONT'D)

VII. PREDEMONSTRATION BRIEFINGS	REMARKS
<ul style="list-style-type: none"> A. By Operator//FAA Team Leader to Crewmembers <ul style="list-style-type: none"> 1. Describe purpose of demonstration 2. Initiation signal 3. Applicable time limits 4. Safety observer responsibilities B. By Operator to Passengers (if applicable) <ul style="list-style-type: none"> 1. Purpose of demonstration 2. Listen to F/A instructions 3. Importance of safety C. By FAA Team Leader to FAA Team <ul style="list-style-type: none"> 1. Demonstration objectives 2. Review initiation/termination signals 3. Review team member assignments 	
<p>VIII. FULL SCALE OR PARTIAL ABORTED TAKEOFF DEMONSTRATION</p> <ul style="list-style-type: none"> A. Advise operator to board passengers (full-scale) B. F/As prepare for normal departure, conduct briefing, and be seated. C. FAA team distributes carry-on baggage, blankets, and pillows (full-scale) D. FAA team leader ensures crewmembers and team members are ready E. FAA team leader informs company coordinator to initiate the demonstration F. FAA team leader times demonstration and sounds stop signal G. After demonstration the team members <ul style="list-style-type: none"> 1. Conduct post demonstration inspection 2. Meet with team leader to discuss results 	

FIGURE 3.10.1.1.(CONT'D)

IX. FULL SCALE OR PARTIAL DITCHING DEMONSTRATION	REMARKS
<p>A. Predemonstration inspection of emergency ditching equipment conducted by FAA team.</p> <p>B. FAA team leader ensures crewmembers and team members are ready then advises the Captain to initiate the demonstration.</p> <p>C. FAA team leader times for six minutes to simulated water landing</p> <p>D. For Full-Scale Demonstrations</p> <ol style="list-style-type: none"> 1. All liferafts/sliderafts are launched and inflated 2. Crewmembers assigned to each inflated raft will enter it and locate and describe the use of each item of emergency equipment. <p>E. For Full-Scale Demonstrations:</p> <ol style="list-style-type: none"> 1. One liferaft/slideraft is launched and inflated. 2. All other rafts are removed from storage and inspected (sliderafts are <u>not</u> detached). 3. Crewmembers assigned to the inflated raft will enter it and locate and describe the use of each item of emergency equipment. 	
X. COMPLETE EMERGENCY EVACUATION DEMONSTRATION REPORT	

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